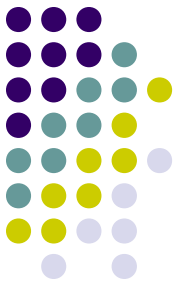


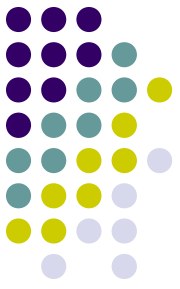
Nonstructural Alternatives Inland Navigation



- **Bill Frechione**
- **Economist**
- **Corps' Inland Navigation
Planning Center of Expertise**

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Inland Navigation System



**Upper Miss
& Illinois**

**Ohio
River**



09/03/10

Ohio River and Upper Mississippi Comparison



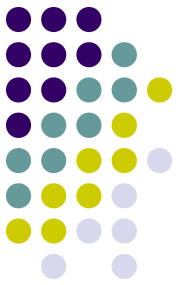
Ohio

- 1. 20 Projects**
- 2. Two locks per project**
- 3. Coal is the principle commodity**
- 4. Little seasonality in shipments**
- 5. Open year-round**

Upper Miss

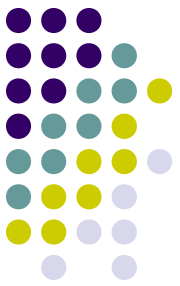
- 1. 37 Projects**
- 2. One lock per project at 31 of them**
- 3. Grains are the principle commodity**
- 4. Seasonal shipping linked to harvests**
- 5. Closed during the winter**

Traffic on the Ohio River



Historic Ohio River Traffic (Millions of Tons)			
Year	Total	Coal	Coal as % of Total
1950	48.9	n.a.	--
1960	79.5	39.7	49.9%
1970	129.6	59.0	45.5%
1980	155.9	85.2	54.7%
1990	224.7	136.3	60.7%
2000	236.5	118.9	50.3%
2001	242.5	128.0	52.8%
Source: Various issues of Waterborne Commerce of the U.S., Part 2.			

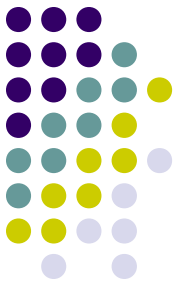
Ohio River Navigation System Age of Projects



Age	Projects
0 - 20	1
20 - 40	9
40 - 60	5
60 - 82	5
Total	20

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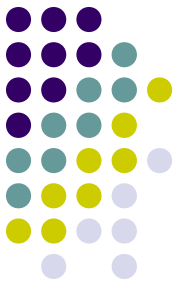
Traffic Delays



Significant delay situations develop when a main chamber is closed.

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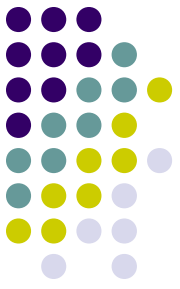




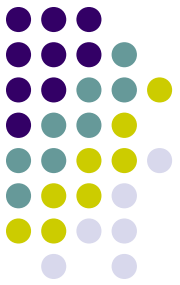
ER 1105-2-100

The first phase in planning is the identification of alternatives, giving equal consideration to structural and non-structural

Non-Structural Measures

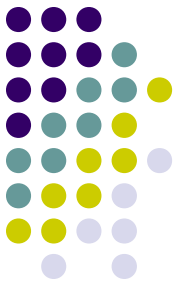


Include items like requiring appointments for lockages to reduce delays

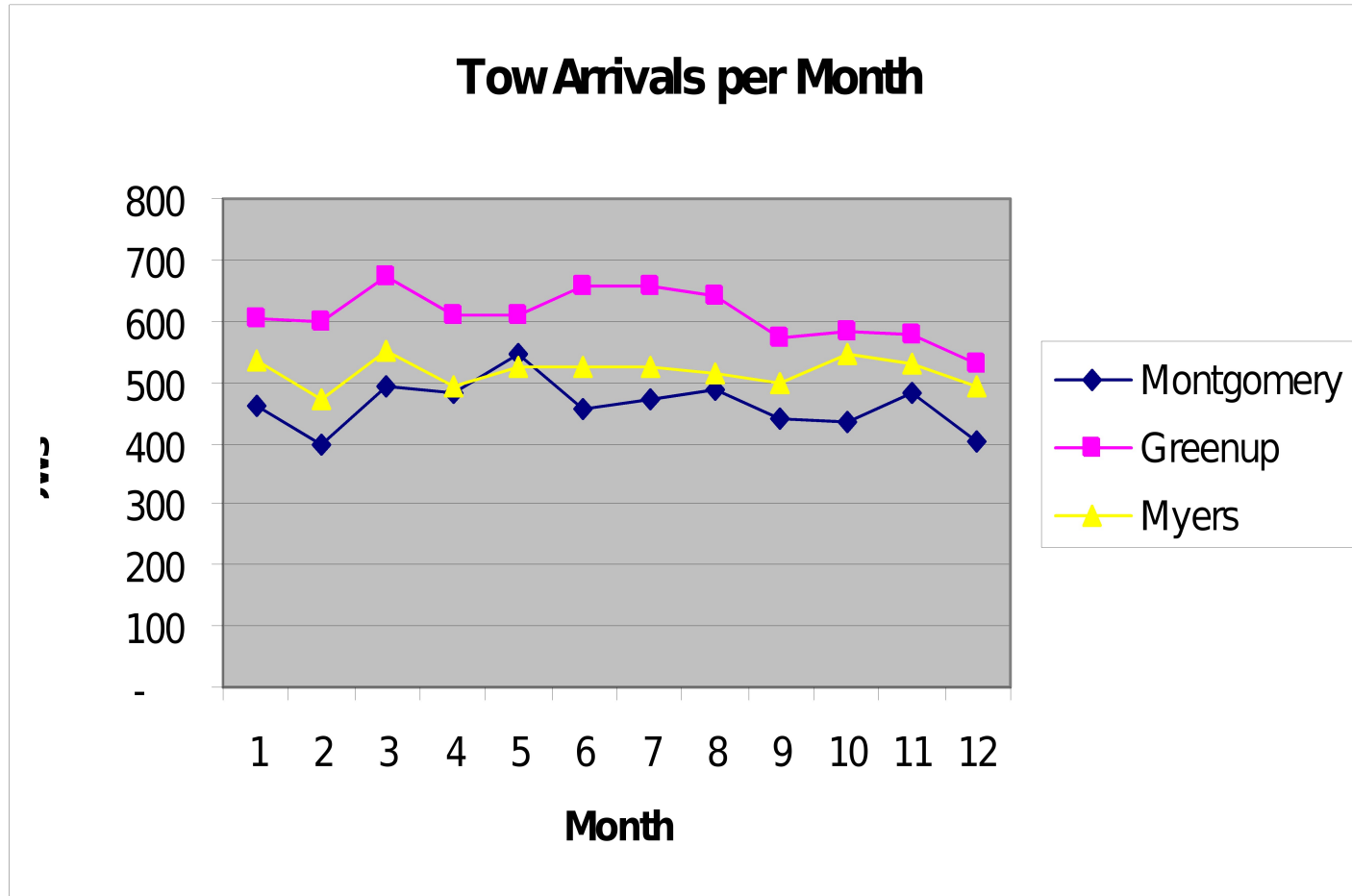


Nature of Delays

- 1. Concentrated pattern of arrivals that causes temporary but major delays - rush-hour?**
- 2. Non-concentrated pattern of arrivals that exceeds the capacity of the projects to process the tows?**

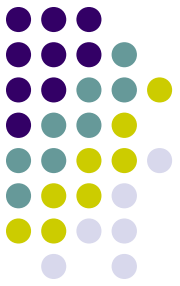


Tow Arrival Patterns

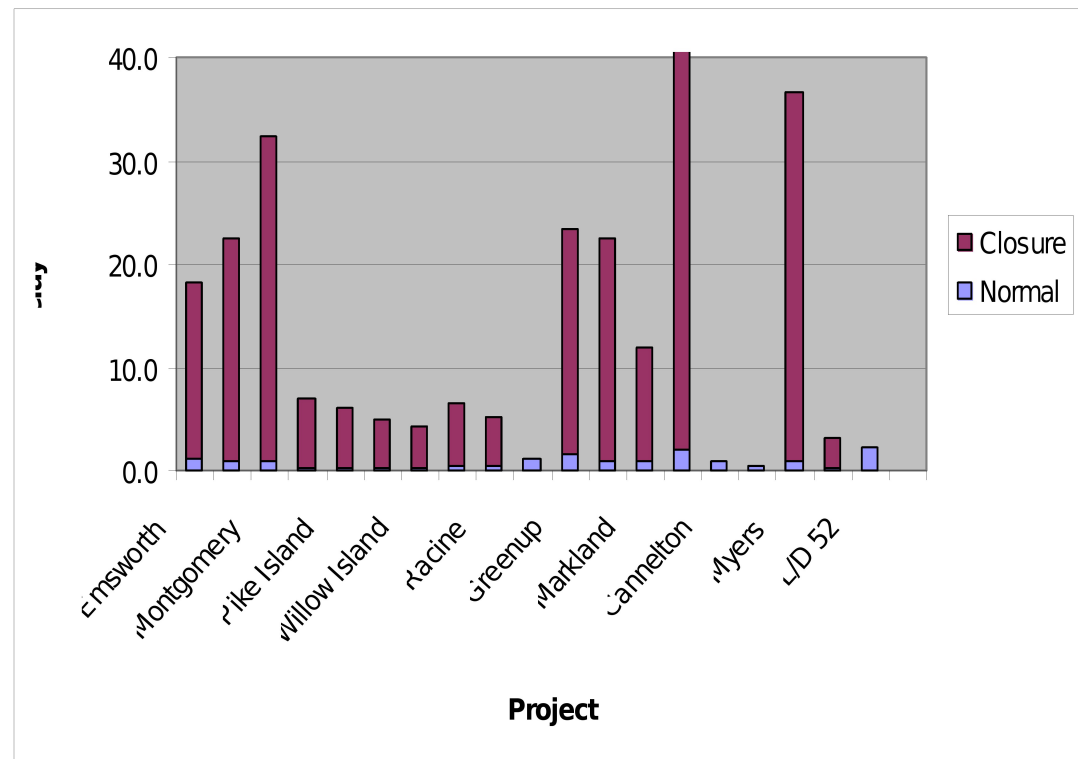


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Normal and Closure-Related Delays

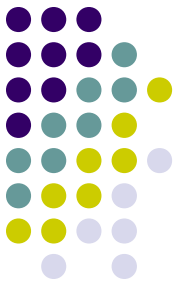


Normal delays are minimal. Closure-related delays are significant.



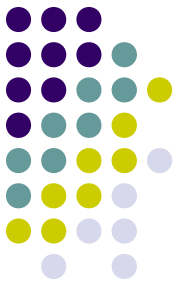
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Possible Low-Cost and/or Non-Structural Measures



- 1. Tow-haulage units**
- 2. Industry self-help program**
- 3. Change the order of lockages to reduce “idle” time**

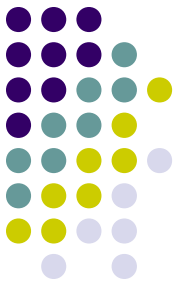
Comparison of Capacity with Various low-cost and/or Non-Structural Improvements



	Minutes / Tow	Tows/ Day	Improvement over Baseline	
Main	60	24.0		
Auxiliary				
1. double trip	240	6.0		(baseline)
2. tow-haulage	165	8.7	45%	
3. self-help	140	10.3	72%	

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Demand Side Non-Structural Measures

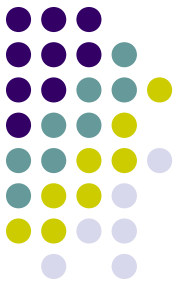


Currently Implemented

- 1. Reroute traffic**
- 2. Modified shipping plans:**
 - i. increase useful (loaded) lockages**
 - ii. alter arrivals to avoid closures**

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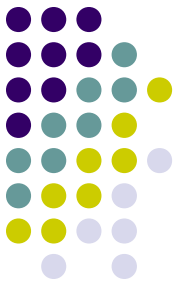
Data Indicating Industry Implementation of Demand Side Management



	Percent Loaded		Tow Arrivals per Day	
	Normal	During Closure	Normal	During Closure
Upper - Montgomery	64%	76%	12.7	8.9
Middle - Greenup	60%	65%	18.7	13.4
Lower - Myers	66%	70%	16.3	16.1

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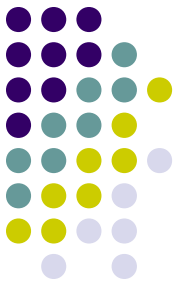
Structural Measures to Address Residual Inefficiencies



- 1. Congestion fees - divert marginal traffic off waterway and thereby reduce delays**
- 2. Lockage Scheduling - assign specific lockage times at congested project**
- 3. Shipment Scheduling - assign specific times when a shipment can move on the waterway**

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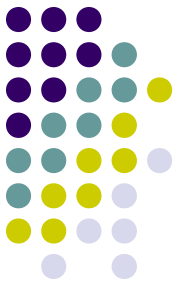
Effectiveness of Demand Management Measures



Addresses symptoms of closures and not causes.

Principle cause is the need to shut down chambers for maintenance and repairs. The frequency generally increases with time.

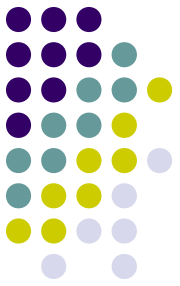
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Deteriorated Lock Wall



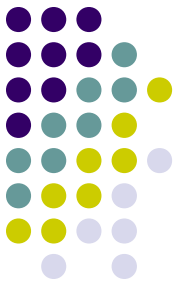
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What is our Goal?

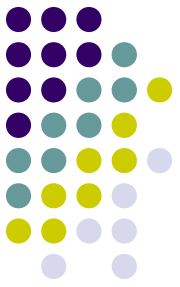
- **Eliminate all delays at locks?**
- **Contribute to the efficiency of the nation's transportation system?**

Waterway Transportation



When available, waterway transportation is the most efficient and least polluting mode of transportation

Fuel Consumption and Emissions by Mode



	Ton-Miles/ Gallon	Pounds of Emissions/ Ton-Mile
Barge	588	0.48
Rail	255	1.44
Truck	75	2.11

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Other Transportation Impacts

Waterborne transportation impacts on quality of life:

- Energy conservation - less fuel
- Reduced emissions
- Improved public health and safety



Other Transportation Impacts



Air Quality

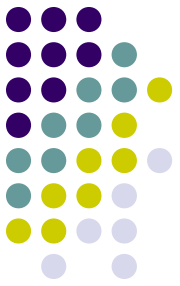


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Highway Safety

Non-Structural Analysis - Conclusions



- Corps regulation and industry practice emphasize use of nonstructural measures
 - Includes both supply (helper boats) and demand management (scheduling closures & re-schedule arrivals)
 - Current practices are very effective, increase capacity by 92% and thus reduce delays.
- Aggressive supply and demand management measures are difficult to implement and evaluate
 - Liability and logistics make helper boats unpopular with carriers on Upper Mississippi system
 - Congestion fee system does not appear economically feasible on the Ohio
 - Lock scheduling appears unworkable
- Traffic management plays a key role in the current use of the inland waterway system

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